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ABSTRACT

A management information system (MIS) is a systems approach to data processing. It provides relevant, timely, and accurage data to decisionmakers, as well as information storage, retrieval, and transfer functions through the use of computers. Educational administrators have been slow to implement computerized data processing either because they fail to understand information systems or because systems planning has been neglected. Population growth and the changing role of education necessitate implementation of computerized data handling. Data processing personnel are in the best position to give educators guidance in data processing and should be given greater roles in decisionmaking. Only with a good information management system can current administrative and educational confusion be ended. (RA)

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The Concept of Systems Management in Educational Data Processing

by

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Abstract

This paper, originally presented at the annual meeting of the Texas Chapter of the Association for Educational Data Systems was also included as part of a national AEDS workshop on management systems held in Washington, D. C. on October 29, 1968.

The purpose of the paper is to define an educational management information system and explain the necessity for the complete involvement of system users in order to obtain system efficiency.

The Concept of Systems Management in Educational Data Processing

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Introduction

Management information systems and information management systems are the topics of many discussions in the computing industry. Presumably, the former provides information to management, assisting in the decision making process, and the latter creates order in a mass of information. Since there is little difference in the final product between the orderly and systematic processing of required data, and the making available in a systematic fashion of the necessary data for evaluation and decision making, the choice of titles must of necessity rest with the individual. This paper assumes they are the same and the discussion which follows is an attempt at clarifying what is data systems management in education, why it is needed, and how it should be approached.

What is a Management Information System?

Many of the current problems in American education are described as information management, or system problems. Information management problems are woven throughout the entire fabric of the educational process, from problems of storing, retrieving, and displaying information, to problems of receiving, learning and using information.

Probably the greatest influence for this technological and educational progress is the computer itself. We are in an era completely dominated by the computer, so much so that many have claimed that the "Computer Age" will be a more important milestone in human history than the Industrial Revolution.

If we recognize this and wish to do something about it, can we use this greatest influence, the computer, to keep abreast? In the electronic computer, can we hope to find the solution to information management and control problems in education?

One method of solution lies in the MIS or systems approach. A Management Information System (MIS), must by definition furnish to management, relevant, accurate and timely operational data to assist them in the performance of their educational tasks. Such a system should not be restricted to just those persons classed as managers, for it is a fact of life that everyone in an organization must make decisions of one kind or another. Managers have to make more of them and the consequences thereof are of deeper significance.

A true MIS, therefore, is one that provides the mechanism for better task performance throughout the structure of a school system on every level of activity.

The major objectives of an Management Information System may be summarized as follows:

1. Provide data to assure adequate managerial direction and control of all aspects of the educational system.
2. Provide evaluative assistance in the analysis of educational programs and concepts, as well as of program implementation.
3. Be responsive to, and facilitate revisions brought about by improvements, requirement changes, and technological advances.
4. Afford an ongoing evaluation of the MIS itself.
5. Provide a medium for the dissemination of information and interdepartmental communication.

Why is an MIS Important?

Schools themselves are the source of a veritable mass of data responsive to automation which can be fairly well classified into 5 areas.

1. Financial operations including purchasing, payrolls, financial accounting, and budgeting.
2. Property accounting including inventory, facilities and services, warehousing and delivery schedules.
3. Student accounting which includes scheduling, grade reporting, test scoring, counseling, and transcripts.
4. Personnel including teacher certification, applicant files, retirements, ratings, and leave.
5. Education including course content assessments, computer assisted instruction, program evaluations, simulation.

At present most of this data exists, although its presence is often unknown. Many times it languishes in a forgotten pigeon hole because of the importance of daily chores. Educators, to be sure, recognize this fact and are anxious to do something about it; unfortunately it is frequently approached like a hole in the roof. When it's not raining there is no point in repairing the hole; when it is raining, it is too wet to work outdoors. Exploding school populations and the need for new techniques in both teaching and program evaluations are forcing us to find new and rapid methods for handling data and decision making. Any attempt to forestall the inevitable by refusing to accept the aid of automated data handling in large school systems can only prolong the confusion and increase the burden of data conversion.

Dr. Ernie Anderson, former president of AEDS, recently stated in "Nations Schools" that the weak link in educational data processing is usually not found in the equipment used but with the people involved. He then proceeded to list five observations based on existent school systems of which the fifth seems relevant here. He wrote "Time should be taken to help top administrators understand data processing and what it might mean for their schools--data processing is something they must make decisions about, and its use can affect their decision making processes in almost all areas."

To the above one might add that decision making is probably the most important function of an administrator. Fifty years ago, most decisions in the educational environment could be made and were made at a conservative pace, in keeping with the pace of social development. The subjects taught in school were relatively limited and educational attainment was measured by proficiency in the 3 R's and the social graces. Textbooks wore out before they became outdated. Today this is no longer true. The course offerings in today's schools are myriad. Texts become outdated overnight. Professions disappear and are replaced by others requiring a totally different academic background. It has been estimated that the average high school graduate of today must prepare himself to change professions three times during his working life.

Obviously, to operate at such an accelerated pace, administrators must accelerate their decision making. The decisions they make must be based on accurate, up-to-date, and comprehensive information. That information must be abstracted from the tremendous volume of data pouring in from many sources, most of which was unheard of or at least not considered an important factor a generation ago.

Since administrative officials as a class outrank data processors, the demand for faster and more efficient methods of handling this paperwork has been passed on to computer personnel for resolution. "Let George do it" has become an axiom for "passing the buck." Who is George? The educational data processor.

In response to this pressure for quick results, many educational data processors have had a tendency to associate the computer with speed alone and not with the new functions resulting from that speed. Personnel shortages and in some cases a lack of system planning, force them to adapt hand methods and old applications to automation rather than determine new applications. As a result, through three successive generations of automated equipment, the tendency to emulate has been the easy way out, and it is literally true that hand sorting and desk calculator procedures have been programmed into the most sophisticated of electronic computers.[1] Another tendency has been to consider each application as a unique whole and to program it either without regard to other applications or often in spite of them. Thus there is no cross reference capability nor compatibility in data definitions. This is not the isolated circumstance, it is the vast majority.

How Does One Approach Systems Management?

Probably the most important reason for the slow diffusion of computer systems applications into education, is the lack of widespread demonstration and dissemination of results achieved by successful data processing installations. To a great extent, operational school personnel do not know what computers and data processing systems can do for them in helping to solve their problems.

This is one area in which the responsibility for its resolution lies not with the educator but with the data processor. Again, perhaps, the source of the

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[1] A good case in point is the alphabetic assignment of personnel numbers for efficiency in machine sorting. Miss Adams is assigned a low order number, Mr. Williams is given the highest. As soon as Miss Adams marries Mr. Smith, or Mr. Yancy is hired, the whole system blows up and loses its significance but the procedure is maintained. It would be much more efficient for the computer to assign a random number, or human engineering wise, to use social security numbers.

problem lies in the heavy work load (in this case the data processor's), but such an excuse is not a valid one. Additional help would be authorized if operational personnel were indoctrinated in the services they might expect and uses to which a computer might be put in the solution of their (the educator's) individual problems. Operating funds in like manner can be made available if their use is sufficiently warranted.

This dissemination of information extends beyond the confines of a specific school system. Too often those educational data processors who have the most to offer have the least to say and for better or worse, much of their work must be repeated in other districts. An encouraging start for the sharing of this information on a national basis has been made by the Association for Educational Data Systems. However, AEDS will only be as good as its members make it, and thus responsibility returns once again to the computer professional.

Another contributor to the limitations in present usage is the fragmented approach to system design. A total systems approach is a meaningless though often used expression, but the closer one approaches totality, the better the system will be. To serve the information needs of the administrators, teachers, counselors, students, and program directors, a system must be designed with all potential users in mind. Consideration must be given to all data sources and all data destinations within the framework of the proposed system.

From the experience gained in military, business and scientific applications of computers, it seems likely that as the number and variety of significant applications in education grows, and as their value and usefulness are demonstrated to educators, the demand for management systems and integrated applications increases. As a result, we can expect that computer technology will provide effective assistance to educators in realizing their educational objectives.

The preceding discussion has attempted to point out several factors which might be compared to the effect produced by the action of an irresistible force on an immovable object. We have significant pressure building up for more and better education, resulting in a consequent administrative burden which is so overloaded that it cannot meet the demands. Of course, as in many other insurmountable problems there is a solution. Systems Management and MONEY! Since it is a lot easier to do something about systems management than money, I shall confine my remarks to the former.

There are two extremes in the concept of educational data processing systems and many variations between. One concept is that no two school systems are alike and therefore any system design work must be unique to its subject schools. People believing this and lacking funds for system development, throw up their hands and do nothing. The other concept is that all school systems are essentially the same, and what has been done for one can be used in any other. This usually results in procrastination while everyone waits for John to do the "dirty" work. The truth of course lies somewhere in between, and many applications can generally be applied with suitable adaptation. Student scheduling programs for example, can be readily transferred from school to school adapting for curriculum variation or other local requirements. Payroll generation programs are also fairly standard and when properly documented can be readily modified for unique circumstances.

Now if some computer programs, which are the most explicit product of a computerized information system, can be transferred from district to district economically, it stands to reason that the overall system specifications and system documentation can become more and more applicable, as they regress from the specific and approach the general or conceptual stage. It is also true that within the conceptual area, more active participation can be expected from administrators and evaluators since the language spoken is not a technical one. It deals with common educational goals, not the explicit mechanics for obtaining them. It is objective, not subjective.

A practical approach to the establishment of such a common language is by means of an advisory committee having representatives from all departments in the school system. Their charter would be to define in realistic terms their immediate and long range objectives, to evaluate the services provided by data processing, and to recommend priorities for additional computer services.

This advisory committee should not be taken lightly. It represents top management and ultimately determines the success or failure of the entire information system. As the committee progresses and becomes familiar with the computer's potential, the influence exerted becomes a two way force. The computer presents information to guide the committee in their respective operations as they concern program planning, budgeting, accounting and evaluation. The committee provides a stimulus for additional computer services to assist in these vital functions.

We thus establish a dynamic organization at the top level of school administration which is every bit as important to sound systems management as the computer installation itself. If this establishment of a high level system committee is to be worth the effort, it obviously must represent all functions within the school system, and any decisions reached must be democratic and equitable. The next fundamental rule for good management concerns the computer facility itself and the personnel involved in making it run successfully. They both must be responsive to the committee as a whole! They cannot effectively perform their function of serving the entire system, if in the table of organization they are considered as a section within a department, such as finance for example. The point is that no computer facility should ever be placed in a position where its products and management could be influenced or controlled by one of the previously mentioned five applications areas, unless it is clearly understood that it would be a slave to that function. Since one of the first computer applications is payroll, most facilities start off under the supervision of the finance office. When they approach the stage

of a data management system, they should be responsive directly to at least a Deputy Superintendent or else remove themselves entirely from the school and operate as a service bureau.

If the computer facility is elevated to a department level, it stands to reason that its staff should be capable of producing more than a few report cards, financial statements or program evaluations. As I envision such a facility, it assumes two primary responsibilities. One is the maintenance of existing programs. This is the area of justification, the real payoff in a system since it provides the payrolls, the schedules, the transcripts, et al., that are the product of an ongoing system. Obviously it is an important function and actually the "bread and butter" of the computer facility. Still this is a maintenance responsibility and by itself certainly does not justify locating computer services under the Deputy Superintendent.

The second primary function of the facility will serve to separate the men from the boys. This function justifies the advisory committee, justifies a competent highly experienced director, and justifies a status associated with upper management. I am speaking, of course, of the concept of management consultant. In the District of Columbia for example, this function is relegated to a unique office within the city government. They in effect, provide management consulting services to the Mayor, police department, public schools; in fact to all major departments. The same is applicable to a school district on a smaller scale. In this case they provide management consulting services to the various assistant superintendents and directors.

Agreed, in many cases this guidance is unavailable on a local level. In fact one major reason for the existence of consulting firms is to provide this service. But in the selection of a director of data processing, one should be cognizant of this responsibility and should look for an individual capable of being able to either evaluate consultant services, or provide them himself,

and in addition be able to act as the interpreter between the educational staff and the computer facility. This director is not a shop foreman; he is a planner, organizer and a consultant to his educational peers, who are looking for innovative applications and advanced techniques providing them with the means of producing a sound educational program. If he has the training and experience to serve as a consultant, so much the better. His job is to serve as a liaison between specialists who need information and those who can provide it. He must also be in a position to suggest innovative techniques based upon his own experience and his knowledge of the potential of his facility and supporting staff.

Hopefully, the justifications for an advisory committee, for direct line responsibility, and for computer functions have been made. There remains but one area which needs discussion - the data bases themselves. No matter what the planning, or what the sophistication of the staff involved, no system is better than the data base with which it works. The design of a data base is extremely important. Unfortunately it is all too often relegated to junior staff members. As a result, the design of data bases has not received the attention its importance demands. This is particularly true in the area of personnel. Most systems today associate a function with an individual, and the hide-bound tradition of the one room schoolhouse and the teacher who boards with the parents is still noticeable in many large schools, where they attempt to maintain a patriarchal system.

An overall administrator should have no direct concern with who actually fills a position in a school. It is the position itself and what is accomplished by it that should be of primary interest. Obviously, whether the young lady who occupies the position is a 36-22-36, or a 22-22-22, will have a tremendous effect on the morale of male teachers in the faculty lounge; but is that really management information to the executive who is located 50 miles away? Administrators are interested in what positions exist and what these positions should accomplish, the sources of funds, and the effect on the student. They should

not have to worry about the personality of the body that fills them. That is the immediate supervisors' responsibility.

The management information specialist should therefore relate these positions to functions and programs. It is his responsibility to provide the means for educational and curriculum specialists to evaluate these positions and the results obtained, in terms of what is being accomplished to provide education, and a sense of value to the students who participate in the school programs. How these students are to be trained and whether they will be prepared to face the challenges of their environment, are the important concerns of the educator. Good systems management won't solve all the problems but it will be a great step forward in the pursuit of educational objectives.

Obviously, to perform any kind of evaluation of program, administrators and curriculum specialists must have valid information from many sources. Because of the volume of data, its incorporation into one computer file is not only unwieldy but highly inefficient and expensive. A true system data base will incorporate many files all interconnected by various communication devices, such that any file can interface with any other.

The implications are tremendous in a properly related information system. Consider, for example, budgeting for new schools and their site selection. Demographic information such as population movements, urban development, even juvenile court records, contain valuable information relating to projected schools and educational programs.

Such fundamental concepts as standard terminology, items of communication between files, and file structure based on anticipated use of files are vital to information systems. Once established and with a programming and analytical staff of high motivation and competence, a computer facility can provide many times over the value of its investment in sound management

information. Without good systems management, a sophisticated use of its outputs, and a practical, effective method of collection and dissemination of information, schools will continue their exponential spiral into administrative and educational confusion. A computer assisted Management Information System is one sound approach in reversing the trend.

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